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ABSTRACT

Current theories of intellectual development claim that such development proceeds through invariant sequences of increasingly more adequate cognitive structures. According to the two dominant theories on changes in intellectual functioning during adulthood, intellectual development is essentially accomplished by adolescence, although sharpening and application of these abilities and skills continues in new content areas. The longitudinal approach required for such research, however, suffers from a number of unique methodological difficulties. For instance, the longitudinal approach tends to confuse individual change with historical change and is particularly prone to sampling bias. An examination of longitudinal studies dealing with sequences of intellectual development during the college years reveals a number of methods that life-span developmental theorists have developed to deal with the methodological difficulties of age-change research. Included among these are the cross-sectional sequence, the time-lag sequential, and the longtudinal-sequential methods. Another approach, the Reflective Judgment (RJ) Model presents seven stages of intellectual development that reflect different assumptions about knowledge and reality that underlie different ways in which beliefs are justified. Three studies that follow this model support the claim that the RJ level increases with education and that intellectual development in the college years follows a predicted sequence. (MN)

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Intellectual Development during the College Years: How Strong is the Longitudinal Evidence

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1983

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Abstract

This paper summarizes current theories of intellectual development. These theories posit that development proceeds through invarient sequences of increasingly more adequate cognitive structures. Commonalities and differences among these theories are noted. Testing whether or not adult intellectual development occurs in an invariant sequence requires longitudinal research. Methodological difficulties of conducting longitudinal research are discussed. Finally, the data from three longitudinal studies of reflective judgment are presented. Tests of the claim to sequential development of stages of development of reflective judgment were used. It is argued that both theory and research currently exist to support the claim that adult intellectual development proceeds through sequential stages, and that this progression is described in the reflective judgment model.

The philosopher of science, Sir Karl Popper (1968) has described scientific theories as bold conjectures that have a high degree of testability.

A number of "bold conjectures" about adolescent and adult intellectual development have recently been advanced. These theories share a view of intellectual development as a hierarchical sequence of increasingly more complex and more adequate cognitive structures. Such epistemic development is assumed to be invariantly sequential. That is, while individuals develop or change in their ways of knowing at different speeds, the direction and nature of such change remains constant. Testing whether or not a theory meets the assumption of invariant sequentiality requires that the same individuals can be demonstrated to change over time in the predicted direction. Applying Popper's criterion of testability to theories of sequential epistemic development, therefore, requires longitudinal research. Rutter (1982 p. 110) has written that, "The importance of longitudinal studies is obvious in terms of the need to determine when particular behaviors reach their apogee and when they decline; when behaviors change and when particular associations occur; and especially in examining the sequences of development."

I will therefore, focus my discussion of research evidence for sequentiality of intellectual development during the college years on longitudinal studies. I will do this by a) briefly describing current theories of sequential changes in intellectual functioning during adolescence and adulthood b) summarizing methodological difficulties of testing these theories through longitudinal research and c) describing three recently completed longitudinal tests of one theory of

intellectual development in the college years, Reflective Judgment (Kitchener and King, 1980). The only other longitudinal studies of college student intellectual development have been tests of Perry's (1970) theory and will be summarized by Marcia Mentkowski.

Research on changes in intellectual functioning during adulthood draws from two dominant views of the nature of such development. Labouvie-Vief (1982) has characterized these as theories of aging and theories of growth. Both views have assumed that intellectual development is essentially accomplished by adolescence, although sharpening and application of these abilities and skills continue in new content areas.

The first and oldest, (no pun intended) the theory of aging, defines intelligence as scores on IQ tests, memory tasks, aptitude tests and verbal ability tests. This theoretical tradition has offered a great deal to lifespan research methodology and I will return to it in my discussion of longitudinal research strategies.

The second view, theories of growth, is exemplified by Piaget's theory of genetic epistemology. Here intelligence is described as qualitative change which occurs in invariantly sequential stages of hypothetico-deductive reasoning. Intellectual functioning is said to culminate in the attainment of formal operational thinking. Post-Piagetian developmental theorists (e.g. Arlin, 1975; Basseches, 1980; Broughton, 1978; Kitchener and King, 1981) have adopted Piaget's assumptions about the nature of intellectual development as invariant structural epistemic change. They have, however, extended Piaget's theory, because they do not assume, as he did (Piaget, 1972) that intellectual development ends during adolescence. Argument (Broughton,

1977; Blasi and Hoeffel, 1974; Kitchener and Kitchener, 1981; Labouvie-Vief, 1980; Riegel, 1979) and research (Kitchener and King, 1981; McKinnon and Renner, 1971; Tomlinson-Keasey and Keasey, 1974) suggest that attainment of formal operations may not be accomplished by adulthood and may not mark the final stage of intellectual development.

Theory and research which describe the sequences of intellectual development into adulthood are summarized in Table #1. This table demonstrates that there are a number of such descriptions or "bold conjectures." These theories have been recently published and this, of course, has implications for any longitudinal work in this field. In most cases research results of even a cross-sectional nature are sparse, suggesting that the validity of these descriptions is still being tested. Finally, these cognitive developmental theorists label sequential changes differently. Developmental changes are called "sequences" (Fischer, 1980) "levels" (Broughton, 1978) "periods" (Riegel, 1976) "stages" (Arlin, 1975; Kitchener and King, 1981; Moshman and Timmons, 1982; Sinnott, 1982) and "positions" (Perry, 1970; Sinnott, 1982). This variety of terms reflects a growing uneasiness with and ambiguity about the notion of stage (Fischer, 1980; Flavell, 1982; von Glaserfield and Kelley, 1982). However, regardless of what developmental change is called, these theories assume intellectual development in adulthood follows an invariantly sequential pattern.

Time does not allow a comprehensive comparison of these theories but some commonalities among descriptions of adult intellectual development offers some face validity to the notion of change described in these "bold conjectures."

The descriptions of development reflected in these theories share what Moshman, (1979) and Flavell, (1979) have called development of a "meta-theory." That is, as adult intelligence develops so does one's way of theorizing. Moshman says, "If we construe the knowledge implicit in one's conception of the environment as theory, then we may refer to the knowledge implicit in one's theorizing as meta-theory." During childhood these ways of understanding the world are implicit. Gradually, with the capacity to engage in more abstract reasoning, these explanations for observed phenomena become explicit and in turn one develops the ability to reflect on these explanations or theories (Flavell, 1979; Kitchener, 1982).

This is movement from empirical, concrete knowledge to necessary abstract knowledge and is the result of equilibration process which occurs through interactions of the individual and environment. Through what Piaget called reflective abstraction, meta-theories are constructed "by coordinating a variety of cognitive actions and progressively disassociating their underlying form from their particular content" (Moshman, 1979, p.66). What is the nature of these increasingly more abstract and adequate "cognitive actions"? Theorists differ in their answers. Kuhn (1979) has observed that what marks some subjects as more developmentally advanced is their ability to give up more primitive strategies as new one's develop. While developmentally less mature subjects may have the same capacities, their reasoning is hampered by an unwillingness to abandon strategies demonstrated to be useless or in error (e.g. false inclusion, appeal to personal experience). This process involves the capacity to separate the knower from the known; fallibility from reality, opinion from evidence, perceptions from what

is perceived. For Basseches this necessitates additional and more complex schemata; for Broughton it is reflected in changes in views of self, truth, and reality, for Kitchener and King it involves changes in one's assumptions about knowledge, reality and the justification of one's beliefs. For Perry it involves the development of contextually relative commitments.

Theorists of adult intellectual development differ in their focus on the time span to be investigated. Some (Basseches, 1980; Broughton, 1978; Fischer, 1980; Moshman, 1982; Riegel, 1979) present a "womb to tomb" developmental sequence, others (Arlin, Edelstein, Kitchener and King, Perry, Sinnott), have focused on adolescence and adulthood. Some have focused on multiple ways of knowing (Kitchener and King, 1981; Perry, 1970; Broughton, 1978; Sinnott, 1981) or dialectical aspects of mature thinking (Basseches, 1980; Riegel, 1979). These differences influence the bold conjectures which describe adolescent and adult thinking. Elaboration of these differences and commonalities awaits further analytic and empirical investigations. For now, suffice it to say there are a great many such "bold conjectures." But what of the tests of such ideas? How might these theories of sequential changes in intellectual functioning best be researched?

I will not turn to theories of aging. The work in this area is important to my discussion because of the significant contributions these theorists and researchers have made to the methodology of age-change research.

During the 1970's, a great deal of research was devoted to intellectual development of adults when Baltes (1968) Baltes and Schaie (1974), Schaie and Labouvie-Vief (1974) and others investigated the

commonly held belief that intelligence declines during the latter years. This debate (Baltes and Schaie, 1976; Horn and Donaldson, 1976, 1977; Schaie and Baltes, 1977) and psychometric work (Baltes, 1968; Buss, 1973; Riegel, 1973 and Wohlwill, 1970) resulted in a number of new approaches to assessment of age related changes in intellectual functioning. It is important to note that those who have pioneered in developing these research strategies do not share the view of development held by post-Piagetian theorists described earlier. For example, Baltes and Schaie (1976) have written, "The search for 'invariant' and 'unidirectional' developmental functions in adulthood and aging is not a useful approach" (p. 721). They have argued for a notion of "plasticity" in definitions of intelligence and have claimed that "a major share of developmental differences in intelligence during adulthood and old age (for the variables, samples, and historical period studied) is due to generational-cohort effects and not to ontogenetically invariant aging processes" (1976, p. 723). Baltes and Schaie's assumptions about the sequence of intellectual development in adulthood is opposite that of post-Piagetian researchers. By emphasizing cohort effect, rather than age-effects, Baltes and Schaie have attempted to demonstrate that changes (decrements in adult intelligence) are an artifact of research methodology. Thus, following their research recommendations allows a stricter test of theories that posit age-related intellectual growth.

Developmental researchers commonly use cross-sectional designs to provide initial tests of developmental change. (Cross sectional studies of the post-Piagetian theories outlined in Table #1 are noted in the bibliography). However, these designs do not examine intra-individual

change and confound age with generation effects (Wohlwill, 1970; 1973). Longitudinal studies are the next step in validating these theories.

However, these attempts are not without problems (e.g. Baltes, 1968; Schaie, 1973). As sequential developmental theorist move into the next phase of research, it is useful to review these methodological issues. Aside from the practical concerns of expense and time, longitudinal studies suffer from a number of unique methodological difficulties which I will briefly summarize.

First, longitudinal studies confound individual change with historical change (Nesselroade and Baltes, 1974) and cannot be generalized to other cohorts. Riegel (1976 p. 11) cautions, "In many instances, changes in the physical and social environment are faster and more dramatic than those that individuals may undergo. Subsequently, the growing and aging individuals fall farther and farther behind; they become 'outdated'"

Second, predicting change from data collected through repeated testing essentially provides subjects with practice opportunities (Labouvie, Bartsch, Nesselroade and Baltes, 1974). Thus, longitudinal studies may result in relatively faster movement through developmental sequences than cross-sectional studies which provide no such practice opportunities. This has been demonstrated by Jackson, Campos and Fischer (1978) who compared longitudinal and cross-sectional studies of the development of object permanence. They reported longitudinal testing resulted in a relatively large practice effect. Thus, when age changes are found, they may be attributable to test-retest effects.

Third, the problem of sampling bias, a potential problem in all research is especially problematic in longitudinal studies, since a

volunteer sample becomes even more selective with attrition. (Labouvie, Bartsch, Nesselroade and Baltes, 1974).

Finally, sequential developmental theories predict homogeneity of age cohorts. This lack of variability among subjects reduces the reliability of the measures used, further complicating interpretation of age changes.

It has been suggested that "simple longitudinal designs with repeated observations of the same group of individuals may represent, due to test and dropout effects, a less than optimal procedure for obtaining valid information on intra individual age changes and may be as misleading, though for different reasons . . . as conventional cross-sectional designs" (Labouvie, Bartsch, Nesselroade and Baltes, 1974, p.288).

Life-span developmental theorists have attempted to deal with these methodological difficulties of age-change research and have developed a number of design modifications that combine longitudinal and cross-sectional methods in ways that reduce the limitations of either single method. I will first describe these and then turn to the longitudinal studies of Reflective Judgments which is one of the bold conjectures with the strongest empirical base. I will focus my remarks on the claims this theory makes about sequences of intellectual development during the college years.

1) Cross-Sectional Sequence (Baltes, 1968)

Independent observations are made of different age groups at at least two different times. Here different independent samples from the same cohort are observed at a specific age level. Baltes (1968) suggests that such a design with independent samples is more economical

and more valid than repeated measures of the same sample: "A design with repeated measurements seems worthwhile only when there are strong arguments for the need of a test with higher sensitivity concerning the factor and and/or strong arguments for the need of an idiographical kind of analysis" (p. 167). While cross-sectional sequential designs allow for assessment of cohort differences, no assessment of historical or environmental influences are made nor is intra-individual change assessed.

2) Time-lag Sequential (Buss, 1973)

Here independent samples are drawn at different times but in a way that the second sample is at the same age as the first would be if participating in a longitudinal study. Since age is held constant only sociocultural differences can be said to affect cohort differences (Schaie, 1965; Baltes, 1968), thus providing a test of the effects of cultural-historical change. This method, however, does not allow for analysis of intra-individual change.

3) Longitudinal-sequential methods: (Baltes, 1968; Schaie, 1965) (Schaie, and Baltes, 1975). This method samples cohort differences at different times. Longitudinal sequences for two or more cohorts are examined simultaneously. This method permits inferences about age change and cohort differences, and is "ideal for the task of direct and precise description of intraindividual and interindividual components of developmental change" (Schaie and Baltes, 1975, p. 388). In this model however, cohort differences that may be attributed to historical-cultural influences are not controlled.

Of course, the design to be used, depends on the question asked. As Schaie (1973) has pointed out, "past descriptive research has

frequently collected the wrong data to answer the right question, or even worse collected the right data in ignorance of the questions to be asked appropriately from such data" (p.264). In this section of my discussion I will attempt to describe the questions asked in three Reflective Judgment longitudinal studies, the data collected, the answers that can be gained from the data analyses and the questions that remain. One cautionary, perhaps defensive note, is necessary before presenting the data. Difficulties of conducting longitudinal studies outlined above make such research expensive and risky. This risk is reflected in the lack of longitudinal studies in the literature. this is particularly true of longitudinal studies of sequences in adult intellectual development because theories of adulthood have previously posited that there are no substantial changes and, thus, nothing to study. This is an important point to remember as I discuss three such studies that encompass at most a 3½ year time span. It is like Johnson's proverbial talking dog. The wonder is not so much in what it says as that it says anything at all.

The Reflective Judgment model which draws from the work of Broughton, Perry and others, posits seven stages of intellectual development that reflect different assumptions about knowledge and reality which underlie different ways in which beliefs are justified. Kitchener and King adopt the von Glaserfield and Kelley (1982, p. 157) definition of stage as a period of time characterized by "a qualitative change that differentiates it from adjacent periods and constitutes one step on a progression." These stages and their characteristics are summarized in Table 2.

Considering the the Reflective Judgment model is so recently developed and that the data collection method involves an interview that is time consuming and expensive to administer, the number of studies conducted is considerable. These are summarized in Table #3. All studies included here have been conducted by trained interviewers and data have been analyzed by certified raters. Inter-rater agreement has been between .69 and .80. Inter-rater reliability has been between .53 and .98 and measures of internal consistency between .62 and .96. I have organized these studies so as to allow for examination of the results from the perspective offered by Baltes', Schaie's and Buss' research models.

Table #3 shows mean RJI scores obtained from eight studies that measured students (high school to Ph.D. level graduate levels). Differences between groups were significant (p .05 or greater) except for Shoff (1979) who did not compare educational levels and Brabeck's (1982) high school seniors who were not significantly different from the college sophomores studied. Trends in RJI scores have followed the predicted sequence with high school students' mean scores at 2.77 to 3.4; college students 3.3 to 4.3 and graduate students 4.0 to 5.6. These cross-sectional findings support the claim that the Reflective Judgment model reflects age/educational sequential development.

Three longitudinal studies have further examined these trends. These studies are summarized in Table #4. All three studies found significant, though small, changes in mean RJI levels between testing at time 1 and testing at time 2. Though these studies support the claim of sequential development predicted by the Reflective Judgment model, the

real meaning or significance of these studies must be considered in light of the limitations of longitudinal research cited earlier.

Rater drift, a possible source of contamination, was examined by having judges rerate a sample or protocols from the first testing. Kitchener and King reported 92% agreement between scores assigned at time1and those assigned during re-rating. Brabeck reported 88%. No differences were found between RJI scores of subjects who participated in the three longitudinal studies and those who participated in only the first testing. Longitudinal studies may well be themselves an intervention and opportunity for practice provided by repeated interviewing may upset the experimental control. On the other hand, subjects received no feedback on their responses other than what might have occurred through repeated reflection on the stimuli dilemmas presented in the interview. In a sense the longitudinal use of the RJI is what Kuhn (1979) has called a "natural experiment" in that students are confronted with the types of problems they are likely to encounter in everyday life (e.g., What and how to believe news reports).

By overlaying Table #4 onto Table #3 these longitudinal studies can be examined within the context of findings from the previous cross-sectional studies. This allows for some speculation about the longitudinal evidence from the perspective of research designs described earlier.

The Kitchener and King study employed a longitudinal-sequential method. Their findings of significant differences in RJI scores between time 1 and time 2 for all educational groups tested supports the claim that RJ level increases with education. Their finding of significant differences in RJ between educational groups supports the claim that

changes in RJ level are sequential. Data collection for a 6-year follow up of these students is nearly completed. These findings are also supported by Welfel and Brabeck's simple (single cohort) longitudinal studies.

These studies assess change over a relatively short period of time (maximum 3½ years). Though cultural/historical effects may be expected to be minimal, the effect of the time of measurement may be examined by comparing the scores of the same educational levels tested in different years. This is possible by examining the mean RJI scores of college freshmen and seniors. Though conducted at different times and with different samples means obtained from college freshmen (range 3.31 - 3.79) are more like each other than are those obtained from college seniors (range 3.7 - 4.4).

Individual changes are further examined in Figure 1 which shows the mean rounded RJI scores for individuals. Subjects who are noted on the right of the diagonal line evidenced upward change in the predicted direction, subjects to the left showed a downward shift or regression, subjects who fall on the diagonal showed no change. Upward movement was observed in 61% (N=66) of the cases and no change in 31% (N=34). Regression was noted in 8% (N=9) of the cases.

Finally, Davison, King, Kitchener and Parker (1980) described a model to test sequentiality in developmental theories. This model assumes that stages are ordered, but allows that people reason at more than one stage in response to different task demands. According to this model, response patterns may be considered sequential if for any individual subject the second most frequently used stage is adjacent to the first, the third most frequently used stage is adjacent to the

second or the first, etc. The RJI involves presenting subjects with four dilemmas about controversial issues (e.g., whether or not chemical additives in foods are carcinogenic). Each of the four dilemmas is given a three-digit score, representing subject's stage usage. Thus, a subject's RJ stage is the average of the twenty-four numbers which are two certified rater's judgments of the representative stage usage reflected in the four interview dilemmas. A frequency distribution of these scores for each subject was constructed to evaluate the sequentiality of the RJ stages. In Kitchener and King's sample of 137 response patterns 92.7% were admissable (tie-scores included). In Brabeck's study 100% were admissable.

The observed changes, though small, support the claim that intellectual development in the college years follows a predicted sequence. Explorations into the nature of the educational and/or life experiences that promote this development is needed.

As recently as 1980, Kurt Fischer claimed, "So little research has been done on cognitive development beyond adolescence" that "no data are available to provide at test" (p. 495) of predictions from his model of life-span intellectual development during adulthood. This is clearly no longer the case. The bold conjectures exist, and there is initial support for the claim of the sequential nature of intellectual development.

Table 1

Piaget (1967) (Stages: Hypothetico-deductive reasoning)	Arlin (1975) (Stages: Problem finding)	Sinnott (1981) (Positions: Relativistic operations)	Hoshmon (1982) (Stages: Construction of logical necessity)	Labouvie-Vief (1982) (Levels and modes: mature autonomy)	Fischer (1980) (Sequences: Skills)	Riegel (1979) (Periods: Dialectical operations)	Sternberg (1980) (Levels: Dialectical [illegible])	Perry (1970) (Positions: Intellectual & ethical development)	Broughton (1978) (Levels: Self, mind, reality & knowledge)	Edelstein & Keun (1982) (Stages: Regulatory structure of self)	Kitchener & King (1981) (Stages: Reflective judgment)
Sensory-motor				Sensory-motor	1. Single sensory-motor set ●	Sensory-motor dialectical intelligence	- 30 schemata				
			Pre-necessity		2. Sensory-motor mapping ●—●						
Preoperational				Symbolic	3. Sensory-motor system □				1. Objective		
						Preoperational dialectical operations			2. Naive subjective		
					4. System of sensory-motor systems = single representational set □ ● ●		30-50 schemata (non-formalist value relativist)	Positions 1-3 Dualism	3. Divided		
									4. Dualist/ Positivist		1. Copy view
Concrete operations			Implicit necessity		5. Representational mapping ●—●			Position 4 Multiplicity	5. Solipsist		2. Objective reality known by some
						Concrete dialectical operations					3. Objective reality temporarily unknown
				Intersystemic	6. Representational system □						4. Objective reality unknowable
					7. System of representational systems = single abstract □						5. Relativity of beliefs
Formal operations	Problem solving	Pre-relativistic operations	Explicit necessity (Inferential validity)			Formal dialectical operations	+ 50 schemata (full coordinated schemata)	Position 5-6 Relativism	6. Pluralist/ Subjective idealist	Formal reality Autonomy through regulatory self	6. Subjective knowledge
	Problem finding	Relativistic operations		Intersystemic	8. Abstract mapping ●—●			Positions 7-9 Commitment in Relativism	7. Objective idealist/ rational		7. Objective reality/ fallibility of knower
					9. Abstract system □						
				Autonomous	10. System of abstract systems □						

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Table 2

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Characteristics of Reflective Judgment Stages -- P.M. King(1982)

Stage				
1	Reality is known with certainty.	Knowledge need not be examined; it is simply accepted at face value. "It's a known fact..." Facts are not subject to interpretation.	Authorities' beliefs are automatically adopted.	Egocentric single-category belief system. "What I believe is."
2	Not everyone knows for sure.	Knowledge is either true or false. Beliefs are based on authorities' beliefs.	Belief in the "sponge" approach to learning: soak up authorities' knowledge; they are the sole source of truth.	Two-category belief system: some conclusions are true, the others are false.
3	In some areas, knowledge is temporarily uncertain. "Somebody will know for sure if we work at it hard enough."	Beliefs are based on what people want to believe, whatever feels right.	Authorities are suspect. "If they don't know for sure, why are they called authorities?"	Three category belief system: conclusions may be judged as right, wrong or uncertain.
4	Reality cannot be known with absolute certainty.	Beliefs are based on a mixture of examined, concrete evidence and unevaluated prior beliefs.	Because there is no certainty, true and false conclusions do not exist. "As long as we don't know for sure, one conclusion is as good as another." "What is true for me may not be true for you."	Knowledge is seen as abstraction, requiring a more complex belief system.
5	Reality can only be known through personal interpretation of data. What is and what is known are further differentiated.	Beliefs are justified with an emphasis on evidence and on the rules of inquiry appropriate for the context.	Conclusions reflect different perspectives, contexts, procedures and decision rules. Conclusions differ because they are judged against different standards.	Knowledge is seen as the result of interpretation, relative to a context.
6	Knowledge claims are necessarily derived subjectively, but some are better founded or more rational than others.	Beliefs are justified through generalized rules of inquiry applied to the evidence. The evidence itself must be evaluated.	The knower plays an active part in constructing knowledge, through personal assessment or arguments. Expertise is valued.	Knowledge is gained through relationships between elements of different arguments.
7	Knowledge claims can be judged as better or more likely to be correct than others; weight of the evidence makes an argument compelling.	Beliefs are evaluated as more or less likely approximations to reality based on the quality of the data and the critical inquiry process.	The knower is responsible for examining and evaluating truth claims using the most appropriate criteria for testing assumptions about reality.	Because the inquiry process is fallible, judgments must be open to reevaluation.

Table 3

Mean RJI Scores from Cross-Sectional Studies by Educational Level

RJI X	High School				College								Graduate			
	Junior		Senior		Freshman		Sophomore		Junior		Senior		Master's		Doctoral	
	X	N	X	N	X	N	X	N	X	N	X	N	X	N	X	N
6.4																
6.3																
6.2																
6.1																
6.0																
5.9																
5.8																
5.7																
5.6															K&K$_1$	5.67 20
5.5																
5.4																
5.3																
5.2																
5.1																
5.0																
4.9															L	4.94 20
4.8																
4.7															M	4.76 40
4.6													L	4.60 20		
4.5																
4.4																
4.3											S&K	4.35 32				
4.2																
4.1											M	4.08 40				
4.0											W	4.00 32	B$_1$	4.00 29		
3.9									K&P	3.92 20						
3.8																
3.7					S&K	3.76 32					S	3.78 14				
3.6					W$_1$	3.62 32			K&K$_1$	3.65 20	B$_1$	3.70 20				
3.5																
3.4			B$_1$	3.40 30			B$_1$	3.40 30								
3.3					M	3.31 20										
3.2																
3.1																
3.0																
2.9																
2.8	K&K$_1$	2.77 20														
2.7																
2.6																
2.5																

Key Table 3

K&K$_1$ = Kitchener & King, 1981, University of Minnesota, data collected 1977

B = Brabeck, 1982, Women in Catholic private schools in New England, data collected, 1979

S&K = Strange & King, 1982, University of Iowa, data collected 1978.

W = Welfel, 1982, University of Minnesota, data collected 1978.

M = Mines, 1980, University of Iowa, data collected 1979

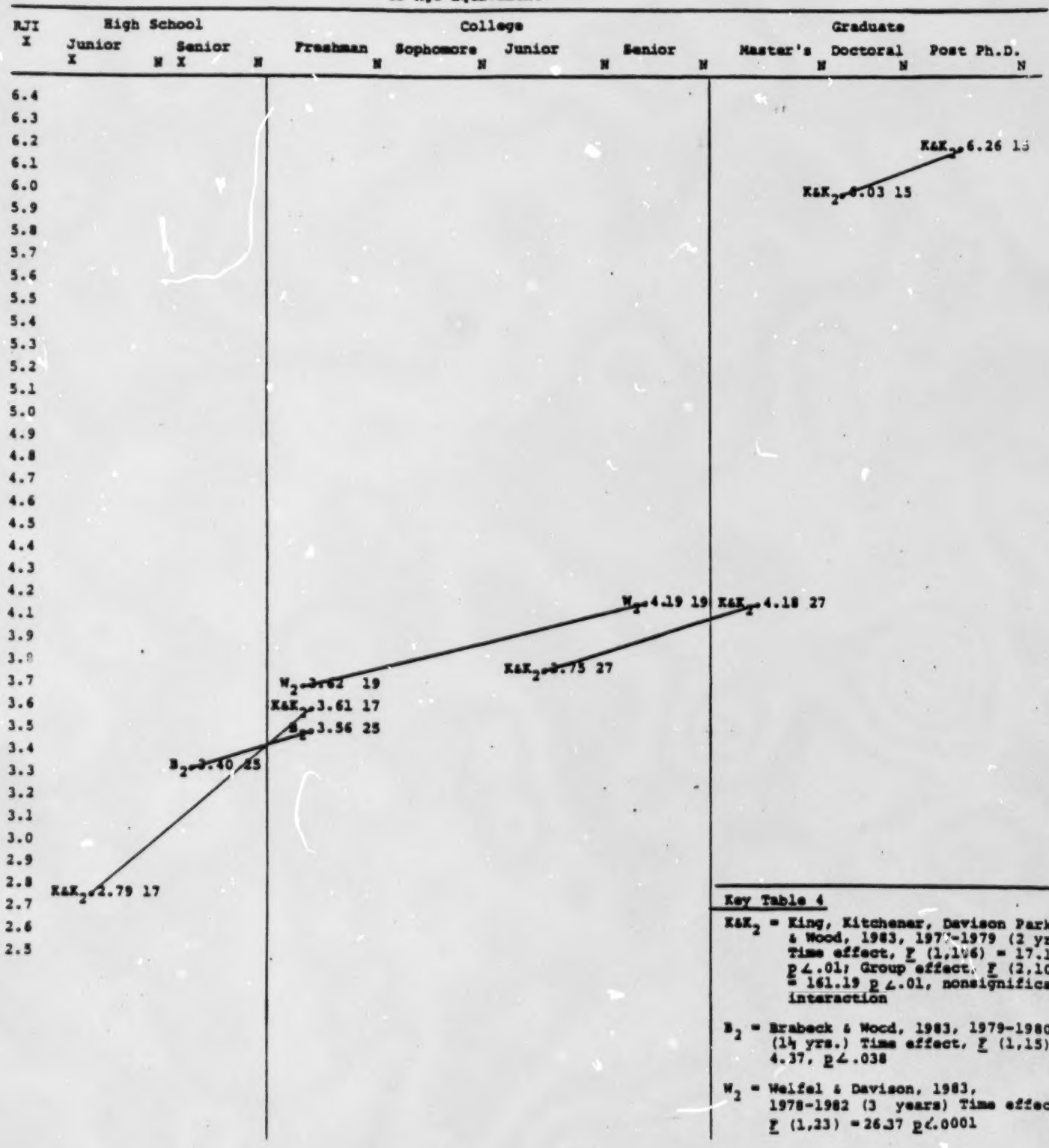
K&P = King & Parker, 1978, University of Minnesota, data collected 1977

S = Schoff, 1979, University of Utah, data collected 1978.

L = Lawson, 1980, University of Minnesota, data collected 1979.

Table 4

Mean RJI Scores from Longitudinal Studies by Educational Level or Age Equivalent



Key Table 4

$K\&K_2$ = King, Kitchener, Davison Parker & Wood, 1983, 1977-1979 (2 yrs. Time effect, F (1,106) = 17.17, $p < .01$; Group effect, F (2,106) = 161.19 $p < .01$, nonsignificant interaction

B_2 = Brabeck & Wood, 1983, 1979-1980 (14 yrs.) Time effect, F (1,15) = 4.37, $p < .038$

W_2 = Weifel & Davison, 1983, 1978-1982 (3 years) Time effect, F (1,23) = 26.37 $p < .0001$

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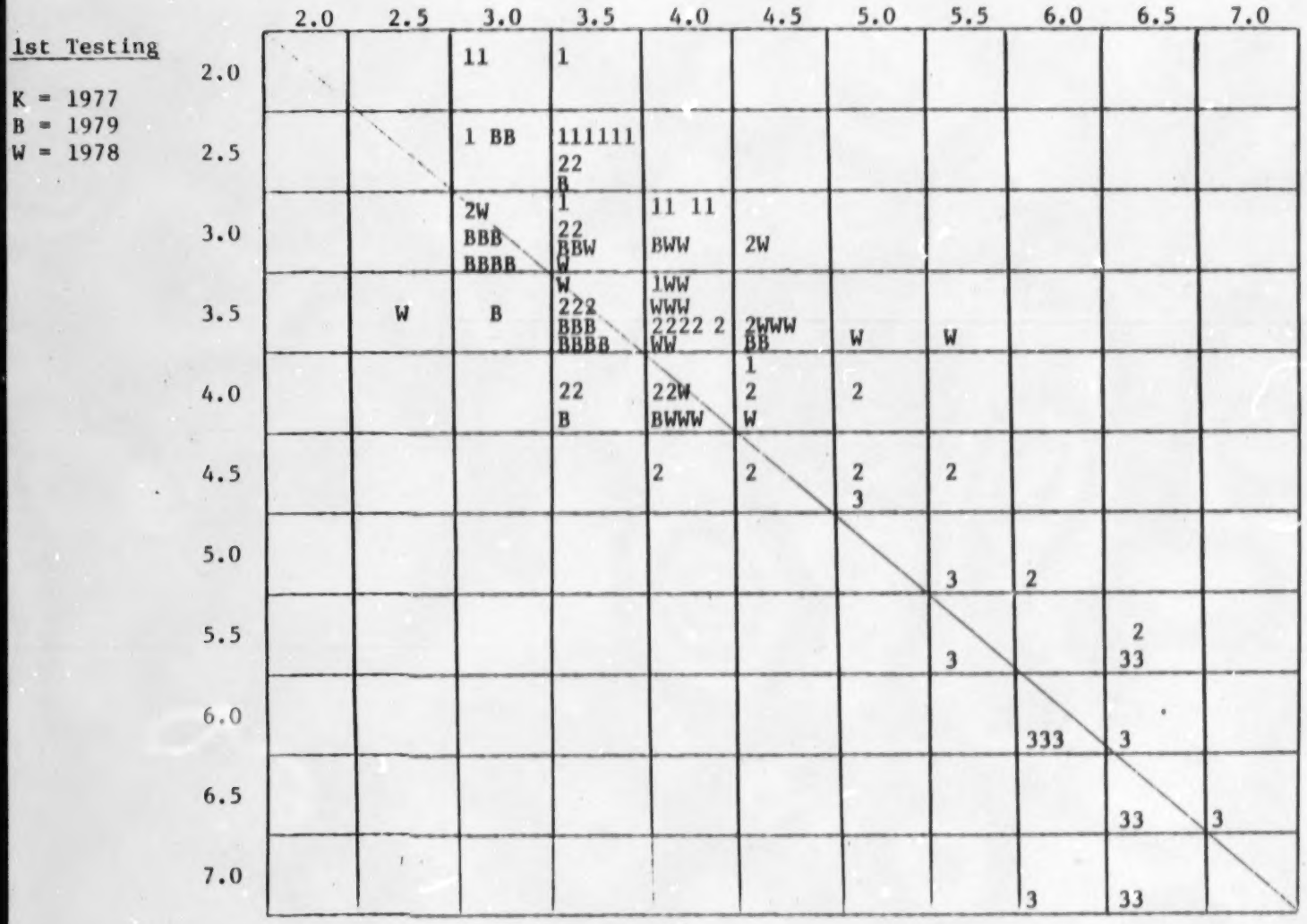
2nd Testing

K = 1979
B = 1980
W = 1982

Figure 1

Individual Changes in RJI
Rounded Scores



W = College freshmen in 1978; n = 25; Welfel.

B = High school seniors in 1979; n = 25; Brabeck

1 = Group 1, High school juniors in 1977; n = 17, Kitchener & King.

2 = Group 2, College juniors in 1977; n = 27, Kitchener & King.

3 = Group 3, Graduate students in 1977; n = 15 Kitchener & King

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